

REMARKS

In response to the Official Action mailed March 13, 2003, Applicants amend their application and request reconsideration. No claims are added or cancelled so that claims 1-16 remain pending.

Two readily apparent errors in the specification are corrected without the introduction of any new matter.

In this Amendment claim 1 is amended to specify that the semiconductor substrate is indium phosphide (InP). This amendment is clearly supported by the application as filed, for example by the description of the first embodiment at page 8 of the patent application. Line 20 describes the substrate as being InP. The claim is also amended to state that the active layer includes a multiple quantum well structure. This description is supported in the application, for example at page 8, lines 26-28. Other amendments to claim 1 make clear what L is, provide a clear antecedent basis for the diffraction grating layer near the end of the claim, and substitute words for various inequalities formerly stated algebraically.

Claims 1-16 were rejected as unpatentable over Takahashi (U.S. Patent 5,960,023) in view of either of Suzuki et al. (U.S. Patent 5,347,526, hereinafter Suzuki) or Nakajima et al. (U.S. Patent 5,412,496, hereinafter Nakajima). These two rejections are separately traversed.

There are significant differences between the semiconductor laser device that is defined by claim 1, the only pending independent claim, and the semiconductor laser device as described by Takahashi. With regard to example 1 described in Takahashi, the substrate is GaAs and the active layer does not include a multiple quantum well structure. Further, according to Takahashi in column 13, lines 6-10, the chips prepared by Takahashi that include semiconductor laser devices are each about 300 μm square. Thus, the optical waveguide does not have a length not exceeding 260 μm , as in the semiconductor laser device of claim 1.

With regard to the refractive index coupling constant, κ_i is 60 cm^{-1} in this example of Takahashi. This refractive index coupling constant corresponds to κ of claim 1. Clearly, the mean coupling factor κ is not at least 150 cm^{-1} as in the claimed semiconductor laser. It is easy to calculate κL from the data supplied by Takahashi and to determine that that product is about 1.8, well outside the range specified in claim 1.

With regard to the example 2 in Takahashi, the semiconductor substrate is InP and the active layer includes a distributed feedback grating structure, not a multiple quantum well structure. See Takahashi at column 17. In this example, the chips are somewhat smaller, about 250 μm on a side so that the length of the diffraction grating is shorter than 260 μm . In the second example, the refractive index coupling constant is $\kappa_i = 35 \text{ cm}^{-1}$, according to column 18, lines 13-15 of Takahashi. Thus, the mean coupling factor of a diffraction grating

is not at least 150 cm^{-1} as in claim 1. For this example, the product κL is 0.875, outside the range specified in claim 1.

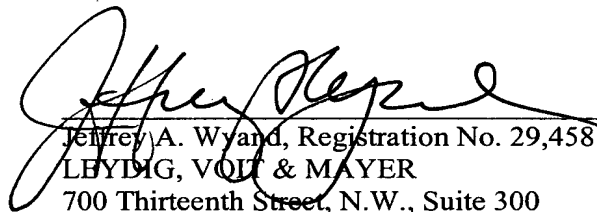
Neither Suzuki nor Nakajima supply the elements of claim 1 that are missing from the two examples of Takahashi.

Suzuki describes a semiconductor laser including an InP substrate and an active layer having a strained quantum well structure. Suzuki states that the product κL should be at least 2. However, Suzuki does not disclose that the product κL should be within the range specified in claim 1. Moreover, Suzuki, like Takahashi, does not describe that the mean coupling factor κ of the diffraction grating layer should be at least 150 cm^{-1} . According, no combination of Takahashi and Suzuki could include all of the limitations of claim 1 and therefore make that claim, and any of its dependent claims 2-16, obvious.

Nakajima describes a semiconductor laser employing an InP substrate and an active layer having a multiple quantum well structure. Nakajima describes a product κL of approximately 4, i.e., within the range of the same variable in claim 1. However, Nakajima, like Takahashi, never mentions, suggests, or teaches that κ should be at least 150 cm^{-1} . Therefore, no combination of Takahashi and Nakajima could include all of the elements of any pending claim. For that reason, the rejection cannot be properly maintained.

Reconsideration and allowance of all pending claims is earnestly solicited.

Respectfully submitted,


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